

ABSTRACT

The present invention provides a heat exchange reactor, which includes at least one tube bundle containing a plurality of tubes arranged substantially parallel to a common longitudinal axis and within an external pressure housing, the bundle

5 having first and second ends in respective first fluid communication with at least one first fluid inlet and at least one first fluid outlet, and the external pressure housing having at least one second fluid inlet and at least one second fluid outlet; at least one baffle oriented substantially perpendicular to the longitudinal axis and disposed about the bundle and configured as a manifold to control a flow of the second fluid; at least

10 one layer of interior thermal insulation disposed between the bundle and the housing and in fluid communication with the second fluid. Other embodiments of the present invention include methods of using and methods of making the heat exchange reactor.

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